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NORTH PLATTE RIVER BIOLOGICAL SURVEY REPORT OCTOBER-NOVEMBER 1963

ROBERT A. TAFT SANITARY ENGINEERING CENTER
CINCINNATI, OHIO

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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
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Robert A. Taft Sanitary Engineering Center
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16. Abstracts The effects of waste discharge on aquatic life on the North Platte River from Torrington, Wyoming to Bridgeport, Nebraska are evaluated. Biological collections and field observations were used.

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SUMMARY AND CONCLUSIONS

1. Waste loads from the Holly Sugar Corporation at Torrington, Wyoming, adversely affected the aquatic habitat making it unsuitable for trout and other game fish from Torrington, Wyoming, downstream to the vicinity of Scottsbluff, Nebraska; prevented the upstream spawning migration of trout; increased water turbidity and silt deposition; stimulated growths of slime bacteria; and reduced fish food production.
2. Industrial and municipal wastes from the Gering, Nebraska area adversely affected the aquatic habitat making it unsuitable for trout and other game fish from Gering, Nebraska, to the vicinity of Bayard, Nebraska; prevented the upstream spawning migration of trout; increased water turbidity and silt deposition; stimulated growths of slime bacteria; and reduced fish food production.

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Biological collections and field observations to evaluate effects of waste discharge on aquatic life were made on the reach of the North Platte River from Torrington, Wyoming to Bridgeport, Nebraska in November 1962 and October and November 1963.

FISH

Electrofish sampling at 14 stations on the North Platte drainage system indicated a well balanced fish population above Torrington, Wyoming, with 16 kinds of fish including rainbow trout and 7 kinds of minnows; and a population reduction in both numbers of kinds and quality of fish in the main river stem below Torrington to Bridgeport, Nebraska. Wastes from Holly Sugar Corporation at Torrington, Wyoming, that included silt, beet tops and beet particles, stimulated the growth of filamentous bacterial slimes, adversely altered the

quality of the fish population, and reduced to 10 or less the kinds of fish found downstream. No trout were observed at the State line and downstream to Scottsbluff; however, a three and one-half pound rainbow trout was taken near the west Scottsbluff Nebraska bridge, approximately 21 miles below the State line, indicating sufficient recovery of water quality to support trout at the time of collection.

During the November 1961 fish survey of the same river stations, it was observed that at all stations below Torrington, Wyoming the fish were concentrated in the shallow clear water areas at the margins of the stream where ground water seepage was entering the stream or in clear drains or tributaries. This reaction was attributed to the high turbidities in the main stream. In general, the main stream during November 1963 was not as turbid as in 1961, and the fish were not as concentrated within a small area but were more evenly distributed throughout the stream. This indicates a general reduction in turbidity as well as improved water quality.

Fish remained concentrated in clear water areas in 1963 at the river cross section below the Holly Sugar Corporation, and at the Minatare, Nebraska, station. The turbidities at both stations were much greater than observed at other stations and more kinds and greater numbers of fish were concentrated in the clearer water showing an avoidance reaction to the sugar

beet wastes at these respective points. Rainbow trout were quite abundant on the opposite side of the river from the Holly Sugar Corporation outfall and none were found on the effluent side. Turbidities at Minatare, attributable to the Great Western Sugar Plant at Gering, Nebraska, were greater than at any other station in Nebraska. Small grease balls were quite evident at Minatare and were observed downstream as far as Bridgeport, Nebraska.

Fish populations were dispersed at Bayard and Bridgeport, Nebraska. Rainbow trout were taken at Bayard, both in the main stream and also in the Bayard Sugar Plant waste ditch which, at present, receives no wastes.

In a drainage ditch near Bridgeport where in 1961, 15 kinds of fish were very abundant, only 6 species were collected in November 1963, and only a few individuals were observed indicating the water to be of such quality that fish were dispersed throughout the main stream.

The reach of the North Platte River from Torrington, Wyoming to Bridgeport, Nebraska has a great potential to develop a successful sports fishery, if waste loads are adequately treated or removed from the system. A rainbow trout spawning migration from McConaughy Reservoir up the North Platte River, and some of its tributaries, occurs annually from October through April. However, the upstream extent is limited because

of seasonal waste loads. These trout, in the past, have been forced to enter only a few clear streams, thus concentrating themselves to the extent that natural food is inadequate, spawning conditions are crowded, and angling pressure is concentrated on a small reach of stream. If the North Platte River was cleared of wastes that fish now avoid, the upstream spawning migration would be extended. During the warmer months high stream temperatures will limit the number of resident trout. However, a warm water sports fishery could be developed to augment winter trout fishing providing water quality was such that game species could survive and propagate.

BOTTOM ORGANISMS

Above the Holly Sugar Corporation Plant outfall the stream supported 23 different kinds of bottom organisms including those normally associated with clean water. These clean water forms make up the major portion of fish food supplied by the stream. Clean water supports many different kinds of organisms whereas those waters fouled with organic wastes support very few different kinds.

Filamentous slime bacteria will often be found where organic waste loads contribute adequate nutrients, dissolved oxygen is present and where the water velocity is sufficient to remove waste products. Profuse growths of slime bacteria

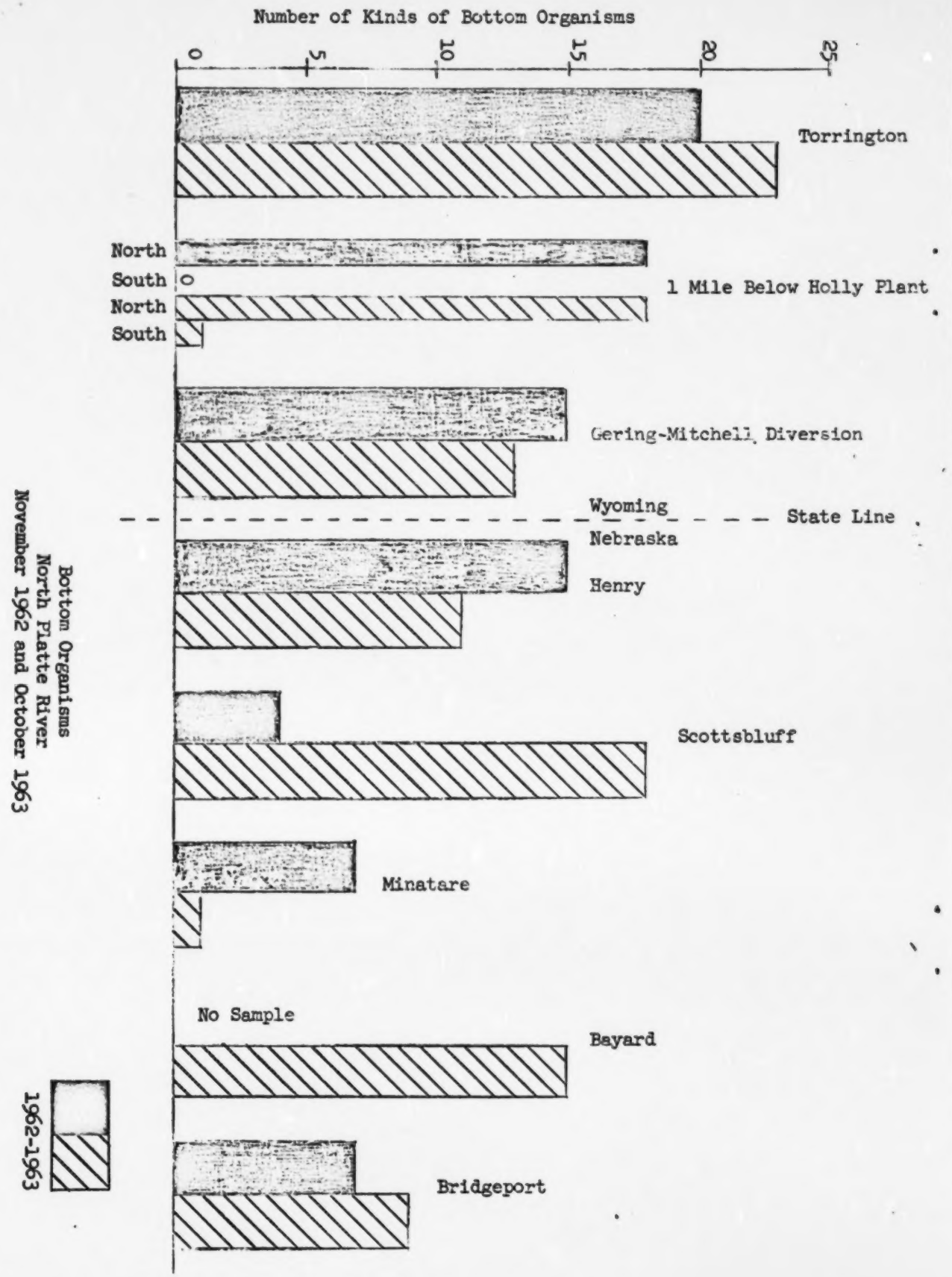
will cover and eliminate favorable stream organisms such as insects, crustacea and attached algae, either by covering suitable substrates and destroying natural homes or by developing on the organisms. Growths of bacterial slimes on organisms such as aquatic insects that serve as fish food would hinder the exchange of gases through the gill surfaces; thus suffocation or increased susceptibility to other causes of death would most probably occur.

The reach above Torrington represents clean water, as indicated by the bottom organisms; below Torrington the stream was degraded and the number of different kinds of organisms was reduced and those present were covered with filamentous slime bacteria. Bottom organisms were also observed to be few in number. During the October 1963 collections, 13 kinds were found at the Mitchell Diversion Dam and much of the substrate including driftwood, rocks and natural debris was covered with slime bacteria. Only 11 different kinds of bottom organisms were found below the State line at the Henry, Nebraska bridge and bacterial slime growths were similar to the above station. Fish food production was low. On November 6, 1963, observations were made at the Mitchell Diversion Dam and at the Henry Bridge stations. Observed organisms were covered with filamentous slime bacteria and will probably be eliminated at some later date in the sugar compaign. At the west Scottsbluff,

Nebraska bridge, 18 different kinds of bottom organisms were collected, and those present indicated recovered water quality at this station. Attached algae were observed and appeared to be in a healthy state. Only a limited amount of slime bacteria was observed.

At Minatare, Nebraska, bottom organisms are adversely affected by waste loads from Gering. Only tolerant midge larvae were found and these were few in number. These data may be compared to data from the Scottsbluff station where 18 different kinds of bottom organisms were found. At Bayard, Nebraska, 15 different kinds of bottom organisms were collected indicating improved water quality. The numbers of individuals, however, remained few

The bottom organisms population at Bridgeport, Nebraska was much reduced; only 9 different kinds were collected. This reduction in both kinds and population is attributed to waste loads by-passed to the stream from the Bayard Sugar Plant earlier in the campaign. By-passing of sugar plant wastes was observed by biologists on October 17, 1963. The reduced population at this station shows how a waste slug can destroy a portion of the bottom fish food organisms.


Number of Kinds of Bottom Organisms
0
5
10
15
20
25
Torrington
North
South
1 Mile Below Holly Plant
North
South
Gering-Mitchell Diversion
Wyoming
State Line
Nebraska
Henry
Scottsbluff
Minatare
No Sample
Bayard
Bridgeport
Bottom Organisms
North Platte River
November 1962 and October 1963
1962-1963